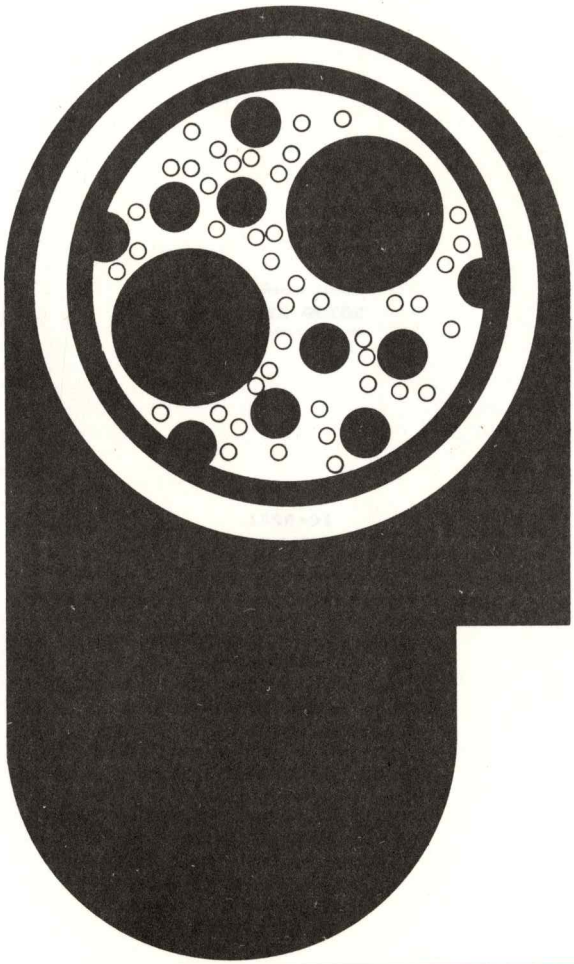
Concordia
UNIVERSITY

ARTS AND SCIENCE
DEPARTMENT OF BIOLOGY



1990-91

DEPARTMENT OF BIOLOGY

COURSE GUIDE

1990-91

THE DEPARTMENT

STAFF

There are 28 full-time faculty members in the Biology Department and a variable number of adjunct professors and part-time lecturers involved in undergraduate teaching. There are 15 support staff (technicians, lab instructors and secretaries) assisting the teaching and research activities.

FACILITIES

The facilities are located on the Sir George Williams Campus. Teaching and research laboratories are primarily located on the 12th floor of the Hall Building. Most faculty members have their own research laboratories and a number of specialized facilities exist including aquatic toxicology laboratories, greenhouses, environmental rooms, sterile transfer areas, isotope laboratory, animal rooms, darkrooms and instrument rooms, holding facilities for water fowl, and a scanning electron microscope.

GRADUATE PROGRAMME

There is an M.Sc. programme available on both a full-time and part-time basis. The graduate programme is a traditional research and thesis M.Sc. degree programme with students working under the guidance of faculty members. There are currently 40 students in the department enrolled in the M.Sc. programme. There are also 9 Ph.D. students working in the Biology Department on special Ph.D. programmes. Graduate students are accepted to work in 4 general areas of specialization in the department: Animal Biology, Plant Biology, Cell and Molecular Biology and Ecology. Graduate students make a considerable contribution as demonstrators in the undergraduate laboratories.

RESEARCH ACTIVITIES

Most faculty members in the department are active in research in one or more of the six areas of specialization previously mentioned. Research is well supported by grants and contracts from external agencies and there is a very high rate of publication by faculty members. Research funding allows faculty members to support graduate students, technicians, research associates, post-doctoral fellows, as well as to purchase scientific equipment. The greatest period of research activity for faculty members is the summer months, during which time both the department and individual faculty members traditionally hire some undergraduate students to assist in research projects. A number of undergraduates have received summer NSERC Fellowships to work on research projects during the summer.

Research seminars are presented regularly during the term, at which guest lecturers, faculty members and graduate students present results of their research to the department. Undergraduates are welcome to attend. The presentation of seminars by students completing Independent Study (490) research projects is a very special event each year and attracts great interest from both staff and students. A Biology students' association exist, which, aside from providing student representatives to participate at Departmental meetings, is involved in various social and academic activities. The annual Science Week on the Sir George Williams campus involves many biology students in setting up displays.

CAREER OPPORTUNITIES

B.Sc. Honours or Specialization in Biology constitute the basic preparation for many graduate programmes (M.Sc., Ph.D. in biological sciences, M. Ed., M. Lib. Sci., M.B.A.) and professional programmes (Medicine, Dentistry, Veterinary Medicine, Law).

Graduates at the B.Sc. level may seek employment as technicians and research assistants in government, hospital, industrial and university laboratories. Those wishing to pursue more senior research or supervisory positions normally require graduate degrees.

A number of government agencies traditionally hire Biology graduates including Environment Canada, Provincial Environmental Ministries, Federal and Provincial Forestry, Health and Welfare, Fisheries and Agriculture.

In the private sector, biology graduates have been hired in the pharmaceutical industry, in scientific equipment sales and promotion, in control labs and in environmental consulting firms.

FULL-TIME FACULTY

Associate Professor and Chairman

P. Widden

Graduate Programme Director

N.N. Kapoor

Undergraduate Advisor

R. T. Cronin, s.j., Ph.D.

Independent Study Advisor

J.D. McLaughlin

Professors	Phone Number
H.E. Enesco, Ph.D. (Columbia)	848-3396
R.K. Ibrahim, Ph.D. (McGill)	848-3399
E.J. Maly, Ph.D. (Princeton)	848-3408
E.B. Newman, Ph.D. (Radcliffe)	848-3410

Associate Professors

P.J. Albert, Ph.D. (New Brunswick)	848-8729
P.D. Anderson, Ph.D. (Oregon State)	848-3391
S.S. Ashtakala, Ph.D. (Toronto)	848-3392
C. Beckman, Ph.D. (Rutgers)	848-3393
R.T. Cronin, Ph.D. (Fordham)	848-3394
K.S. Dhindsa, Ph.D. (Helsinki)	848-3395
D.J. Fairbairn, Ph.D. (British Columbia)	848-3397
M.B. Herrington, Ph.D. (McMaster)	848-3398
N.N. Kapoor, Ph.D. (McMaster)	848-3403
B.S. Mangat, Ph.D. (London)	848-3406
J.D. McLaughlin, Ph.D. (New Brunswick)	848-3409
R.M. Roy, Ph.D. (Toronto)	848-3424
S.M. Ruby, Ph.D. (Western)	848-3411
R.K. Storms, Ph.D. (Alberta)	848-3412
P. Widden, Ph.D. (Calgary)	848-3413 - 3390

Assistant Professors

C.G. Cupples, Ph.D. (York)	848-3427
P.J. Gulick, Ph.D. (U.C. Davis)	
J.A. Kornblatt, Ph.D. (Cincinnati)	

University Research Fellows

G. Espie, Ph.D. (York)	848-3428
L.-A. Giraldeau, Ph.D. (McGill)	848-3425
J. Grant, Ph.D. (Guelph)	848-3421

INFORMATION

The main office of the Biology Department is open to students for general questions at the following location:

H-1260 - Hall Building
1455 de Maisonneuve Blvd. W.
Montreal, Quebec
H3G-1M8

Tel: 848-3400

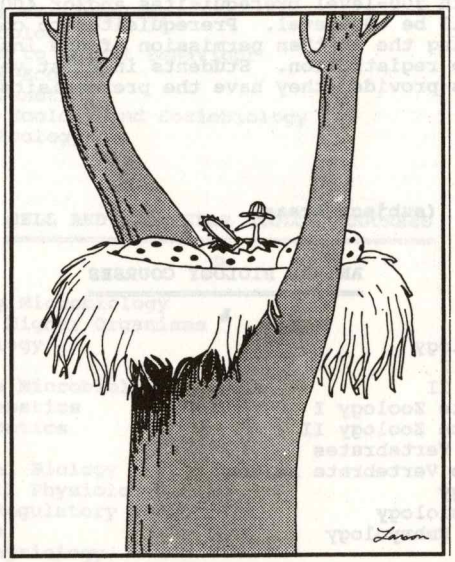
Fr. Cronin serves as undergraduate advisor and coordinator of student guidance and registration at the departmental level. He is available to students for general and/or specific information as follows:

For course information and registration guidance:

Tel: 848-3394

For pre-registration and registration appointments:

Tel: 848-3394 and
848-3400 (Biology Office)



And then, the dawn is still again—and another miracle of nature emerges.

PROGRAMMES

The Biology Department offers a wide variety of courses in botany, animal biology, ecology and cell and molecular biology. Programmes are designed to give the student a broad background in the biological sciences and to allow specialization and diversification according to the interests of the individual student. The programme is highly flexible and requires guidance from faculty advisors so that students can take full advantage of the range of options available.

Although the Biology Department offers Honours, Specialization, Major and Minor programmes, we recommend that students wishing to pursue careers in Biology take either an Honours or Specialization programme. The Major and Minor programmes are not designed to provide an extensive enough background in Biology for students to progress to careers in the discipline. The Major should be considered by students requiring a less specialized degree, with a Biology concentration, or as part of a double major programme. The minor is designed to be flexible and allow a student whose area of concentration is outside of Biology to take courses to provide either a general survey or to gain a more in-depth understanding of one of the major areas of Biology.

COURSE NUMBERING

Normally all courses with CEGEP prerequisites or no prerequisites will be 200-level, and most commonly are taken by students in first year (within 30 credits), or as electives in later years. Those courses with 200-level prerequisites will be 300-level, and normally are taken by students in second or third year. Likewise those courses with 300-level prerequisites and/or 400-level co-requisites will be 400-level. Prerequisites to courses can only be waived by obtaining the written permission of the instructor and chairman prior to registration. Students in first year may take 300-level courses provided they have the prerequisites.

COURSE GROUPINGS (subject areas)

ANIMAL BIOLOGY COURSES

A

230 - Animal Biology
232 - Entomology I
233 - Entomology II
234 - Invertebrate Zoology I
235 - Invertebrate Zoology II
330 - Biology of Vertebrates
331 - Comparative Vertebrate Anatomy
332 - Parasitology
333 - Animal Physiology
334 - Vertebrate Embryology

ANIMAL BIOLOGY COURSES Cont'd

335 - Histology I
336 - Histology II
431 - Biology of Fishes
432 - Comparative and Environmental Physiology
435 - Advanced Parasitology
436 - Biology of Mammals

BOTANY COURSES

B

240 - Plant Biology
242 - Economic Botany
341 - Biology of the Fungi
344 - Biology of Algae
345 - Horticultural Science
346 - Physiology of Plant Development
347 - Plant Anatomy
349 - Plant Nutrition and Metabolism
441 - Plant Biochemistry

ECOLOGY COURSES

C

250 - Fundamentals of Ecology
352 - Plant Field Ecology
355 - Fundamentals of Limnology
356 - Microbial Ecology
358 - Introduction to Animal Behaviour
359 - Evolutionary Ecology
452 - Ecological Genetics
453 - Behavioural Ecology and Sociobiology
454 - Population Ecology

CELL AND MOLECULAR BIOLOGY COURSES

D

261 - Genetics
270 - Introductory Microbiology
363 - Genetics of Higher Organisms
364 - Cell Physiology
365 - Cytology
370 - Intermediate Microbiology
460 - Molecular Genetics
461 - Advanced Genetics
462 - Immunology
463 - Developmental Biology
464 - Advanced Cell Physiology
465 - Biological Regulatory Mechanisms
467 - Cytogenetics
470 - Microbial Physiology

BIOELECTIVE COURSES

E

320 - History of Biology
321 - Evolution
322 - Biostatistics
323 - Biology of Aging
342 - Eastern North American Flora
361 - Cellular Metabolism I
362 - Cellular Metabolism II
380 - Nutrition
381 - Biology of Pollutants
420 - Radiation Biology and Radiotracer Methodology I
490 - Independent Study

plus all courses listed under Zoology, Botany, Ecology and Cell and Molecular Biology.

Biology Courses Not Available for Credit to Students in Biology Programmes - intended for students in non-biology programmes.

200 - Fundamentals of Human Biology
201 - Introductory Biology
203 - Fundamental Nutrition
206 - Elementary Genetics
207 - Microorganisms and Man
208 - Environmental Biology I
210 - Genetics and Human Welfare

SPECIAL TOPICS COURSES - BIOL 298/9, 398/9 and 498/9

Special topics courses can be applied to the various subject areas, according to their titles. Thus, "BIOL 498D - Advanced topics in Cell and Molecular Biology; Gene Structure" would be credited as a cell and molecular biology course. In all cases, the first part of the title will indicate the subject area.

HONOURS IN BIOLOGY - 72 credits

The Honours Programme is designed for outstanding students who wish to follow a rigorous sequence of courses. Students in the Honours Programme are often preparing themselves for graduate study or professional training and it is in this programme that students are given an opportunity to undertake individual supervised research (Biology 490). Students in the Honours Programme are required to take:

33 credits (Organic Chemistry I[3]*, Organic Chemistry II[3]*, Biochemistry[3], Animal Biology[3], Plant Biology[3], Ecology[3], Genetics[3], Microbiology[3], Biostatistics[3] and Independent Study[6]).
6 credits (Animal Physiology[6], or Physiology of Plant Development[3], and Plant Nutrition and Metabolism[3] or Cell Physiology[3] and Advanced Cell Physiology[3]).
33 credits selected from Animal Biology, Botany, Ecology or Cell and Molecular Biology course groupings. No more than 9 credits from Group E.

Certain courses outside the department may be taken for bioelective credit with permission.

In the Honours Programme, students must complete a minimum of 21 credits in 300 and 400-level Biology excluding Independent Study, (490).

SPECIALIZATION IN BIOLOGY - 60 credits

The Specialization Programme is a more flexible programme than Honours. There are 60 credits of required and elective biology courses leaving 30 credits which may be taken inside or outside the Biology Department. It would be possible to obtain a 30-credit Minor in another area while following the Specialization programme. Although there is no requirement for students to take the research study course (490), students with high academic standing in the Specialization Programme are allowed to take this course.

27 credits (Organic Chemistry I[3]*, Organic Chemistry II[3]*, Biochemistry[3], Animal Biology[3], Plant Biology[3], Ecology[3], Genetics[3], Microbiology[3] and Biostatistics[3]).
6 credits (Animal Physiology[6], or Physiology of Plant Development[3], and Plant Nutrition and Metabolism[3] or Cell Physiology[3] and Advanced Cell Physiology[3]).
27 credits from Animal Biology, Botany, Ecology, and Cell and Molecular course groups. No more than 9 credits from Group E. Certain courses outside the department may be taken with permission for bioelective credit.

In Specialization a minimum of 15 credits in 300 and 400-level Biology courses must be completed excluding 490.

* Students who have completed similar courses in CEGEP programmes may request exemptions at the time of admission and, if approved, replace such courses with biology electives.

MAJOR IN BIOLOGY - 42 credits

The Major Programme is frequently taken by students not wishing to specialize exclusively in Biology. This programme is often taken simultaneously with another Major Programme (double major).

21 credits (Organic Chemistry I[3*], Organic Chemistry II[3*], Biochemistry[3], Animal Biology[3], Plant Biology[3], Ecology[3], and Genetics[3]).
3 credits (Cell Physiology[3], Physiology of Plant Development[3], Plant Nutrition and Metabolism[3], Advanced Cell Physiology[3]).
18 credits Selected from Animal Biology, Botany, Ecology, and Cell and Molecular Biology course groups. No more than 6 credits from Group E. Certain courses outside the department may be taken for bioelective credit with permission.

In the Major Programme students must complete a minimum of 6 credits in 300 or 400-level Biology courses.

MINOR IN BIOLOGY - 24 credits

Students following programmes in other disciplines may wish to take a Minor in Biology. This programme is highly flexible; however, it excludes students from courses intended for non-biology students: 200 to 209. Non-science students can take a Minor in Biology; however, they must enter the programme with CEGEP Biology 301 or equivalent.

12 credits selected; three from each of Animal Biology, Botany, Ecology, Cell and Molecular Biology groups.
12 credits Bioelectives or additional courses from Animal Biology, Botany, Ecology, Cell and Molecular Biology groups. Certain courses outside the department may be taken for bioelective credit with permission.

SELECTING COURSES

Students must consult a faculty advisor and should plan ahead at least one year. Since the programme is not highly structured, it is important that students be aware of the prerequisite courses that are required by advanced level courses. For example, Biology 454 requires Biology 353 which in turn requires Biology 250. It is not possible to take all three of these courses in one academic year. In some cases a student may have to take a prerequisite course in the first year in order to take a desired course in the third year because of other pre-requisite courses. So planning is necessary to assure an adequate background for the required number of 300 and 400 levels courses.

Students should not assume that all courses will be presented each year. Some of our courses may not appear in a given year. This does not apply to required courses. Students are free to select courses in day or evening division. The full range of programmes is available in the evening on the Sir George Williams Campus. Many day students find the availability of evening courses an advantage in arranging their schedule.

Students registered in Honours or Specialization programmes usually want to concentrate their studies in Animal Biology, Cell and Molecular Biology, Ecology or Botany. Within our programmes this can be done. The following paragraphs contain suggestions for sequences of core courses for the different concentrations.

ANIMAL BIOLOGY CONCENTRATION

Year I:
Genetics (261)[3]
Fundamentals of Ecology (250)[3]
Organic Chemistry (CHEM 221 and 222)[6]
A minimum of 6 credits from BIOL 230, 232, 234 and 235
Electives 12 credits

Year II:
Biostatistics (322)[3]
Animal Physiology (333)[6]
Vertebrate Embryology (334)[3]
Biochemistry (CHEM C271)[3]
Electives - 18 credits.

Students should consider electives from among the following: BIOL 331, 332, 335, 336 and 358.

Year III: Third year courses should be chosen in consultation with a faculty member in the Animal Biology concentration.

CELL AND MOLECULAR BIOLOGY CONCENTRATION

Students interested in Genetics, Cell Physiology and Chemical activities of organisms would usually select a sequence of courses in the Cell and Molecular stream.

Year I:
Genetics (261)[3]
Microbiology (270)[3]
Organic Chemistry (CHEM 221 and 222)[6]
Elective - 12 or 15 credits.

Year II:
Biostatistics (322)[3]
Cytology (365)[3]
Cell Physiology (364)[3]
Biochemistry (CHEM 271)[3]
Electives - 15 credits

Elective credits and courses for the third year should be selected in consultation with a faculty member.

ECOLOGY CONCENTRATION

Year I:
Genetics (261)[3]
Fundamentals of Ecology (250)[3]
Plant Biology (240)[3]
Microbiology (270)[3]
3 credits Zoology (230 or 234)
Organic Chemistry (CHEM 221 and 222)[6]
Electives - 9 credits

Year II:
Biochemistry (CHEM 271)[3]
Biostatistics (322)[3]
(Introduction to Animal Behaviour (358)[3]
3 of, (Evolutionary Biology (359)[3]
(Limnology (355)[3]
(Microbial Ecology (356)[3]
6 credits Physiology (333, or any two of 346, 349, 364 and 464)
Electives - 3 credits

Year III:
Plant Field Ecology (352)[3] or
Ecology and Behaviour Field Course (357)[3]
Ecological Genetics (452)[3]
Behavioural Ecology and Sociobiology (453)[3]
Population Ecology (454)[3]
Electives - 18 credits

Students are strongly advised to use a minimum of 12 elective credits in order to take organismal courses, selected according to the specific interests of the student. The following is a list of possible organismal courses:

232 and 233 (Entomology I and II)
234 and 235 (Invertebrate Zoology I and II)
330 (Biology of Vertebrates)
332 (Parasitology)
341 (Biology of Fungi)
344 (Biology of Algae)
431 (Biology of Fishes)
435 (Advanced Parasitology)
436 (Biology of Mammals)

BOTANY CONCENTRATION

Year I:
Plant Biology (240)[3]
Genetics (261)[3]
Biology of Algae (344)[3]
Organic Chemistry (221 and 222)[6]
Electives - 15 credits

Year II:
Biostatistics (322)[3]
Biochemistry (CHEM 271)[6]
Plant Anatomy (347)[3]
Physiology of Plant Development (346)[3]
Plant Nutrition and Metabolism (349)[3]
Plant Field Ecology (352)[3]
Biology of the Fungi (341)[3]
Horticulture Science (345)[3]
Electives - 3 credits

The foregoing course sequences are only recommended sequences. Individual interests and aims may indicate that other sequences would be preferable.

ECOTOXICOLOGY

Ecotoxicology is the study of the fate and hazards of toxic substances in ecosystems. Thus professional development in this field leads to various career opportunities related to environmental management. Ecotoxicology is a diverse field and can be approached from various points of view. This specialization normally takes places at the graduate level. A sound preparation to this field of studies includes a fundamental knowledge of ecology systematics, analytical chemistry, biochemistry, biostatistics and the functioning of organisms i.e. physiology.

Suggested undergraduate courses in these disciplines are listed below. Students wishing to know more about ecotoxicology should take:

BIOL 381 - Biology of Pollutants
CHEM 498V - Chemical Toxicology

ECOLOGY

BIOL 250 - Fundamentals of Ecology (3 crs)
BIOL 355 - Fundamentals of Limnology (3 crs)
BIOL 352 - Plant Field Ecology (3 crs)
BIOL 356 - Microbial Ecology (3 crs)
BIOL 357 - Ecology and Behaviour Field Course (3 crs)

PHYSIOLOGY

BIOL 333 - Animal Physiology (6 crs)
BIOL 349 - Plant Nutrition and Metabolism

ECOTOXICOLOGY Cont'd

BIOCHEMISTRY

CHEM 271 - Introductory Biochemistry
CHEM 375 - Intermediary Metabolism

CHEMISTRY

CHEM 217 - Introductory Analytical Chemistry I (3 crs)
CHEM 218 - Introductory Analytical Chemistry II (3 crs)
CHEM 475 - Pharmacology I (3 crs)
CHEM 476 - Pharmacology II (3 crs)

BIOSTATISTICS

BIOL 322 - Biostatistics (3 crs)

SYSTEMATICS

BIOL 234 - Invertebrate Zoology I
BIOL 235 - Invertebrate Zoology II
BIOL 344 - Biology Algae
BIOL 431 - Fish Biology
BIOL 240 - Plant Biology
BIOL 270 - Introductory Microbiology
BIOL 330 - Biology of Vertebrates

HELPFUL HINTS

Course exemptions can be obtained at the time of admission or during the programme for certain courses taken at CEGEP or at other institutions. Discuss this with the admissions office when applying. Students may be granted permission to complete approved courses at other institutions when equivalent courses are unavailable at Concordia.

Students entering Biology programmes from other universities, colleges or CEGEPs in which they have completed introductory subject material presented in introductory core courses may seek exemptions from such courses by writing "challenge exams". Students with suitably high academic standing (B-average) may be allowed to write final or supplemental exams for a maximum of two introductory courses in order to be considered for exemption. If a suitable grade (normally C+ or better) is obtained the student will be exempted from the particular course requirement and allowed to proceed to any courses which have that particular course as prerequisite. The following courses are eligible for challenge exam exemption: 230, 240, 250, 261, 270, 322. Courses for which exemptions are granted will be replaced by approved biology elective courses. For further information, contact undergraduate programme director or departmental chairman.

Normally students will complete no more than 30 credits in the Fall-Winter semester and no more than 12 credits in Summer. One should make every effort to take approximately 15 credits per semester and balance the number of lab sections between semesters. Four lab sections in one semester is an extremely demanding commitment, not only in terms of the lab time but also the preparation and subsequent write-ups.

Students must request permission from the Chairman or Undergraduate Programme Director and the Assistant Dean of Student Affairs to take an overload or to take an alternate bioelective.

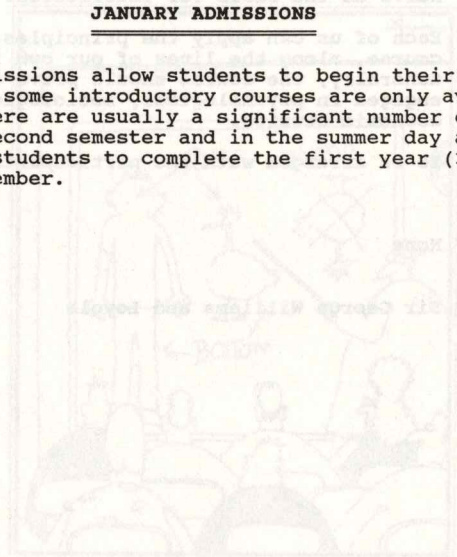
EARLY REGISTRATION

Students who are already in the programme can take advantage of the early registration period, and are strongly advised to do so. This is an opportunity to discuss your programme calmly with an advisor. It virtually guarantees that you will be able to take all the courses that you want or require. It eliminates the inconvenience of delays, frustration and disappointments of traditional September registration.

Please note that a $100 deposit must be paid prior to your early registration appointment. This is only a deposit and you are required to have paid 50% of your fees by early August. Failure to do so will result in your contract being cancelled (i.e. you will lose your courses). Please check with the Registration services for more details (848-2600).

JANUARY ADMISSIONS

January admissions allow students to begin their programme in January. Although some introductory courses are only available in the first semester, there are usually a significant number of courses available in the second semester and in the summer day and evening division to allow students to complete the first year (30 credits) by the following September.



COURSE DESCRIPTIONS

BIOLOGY 200 - FUNDAMENTALS OF HUMAN BIOLOGY

(6 credits) - Lectures only

Instructor Drs. Drummond and Wiseman

Description This course covers the same material as CEGEP 921/931. This is an introductory course for students who have an interest in human biology. It is not available for Biology students. The course discusses life processes in a non-technical manner, employing lectures, demonstrations audio-visual presentations and discussions. The course probes problems not only of organization and functions, but also of health and disease, with a view to a more meaningful life. The fertilized cell is independently capable of developing all the inter-dependent systems of the adult, requiring only food and protection from outside itself.

These systems are considered at various levels: a) the working unit b) the support unit c) the control unit d) the defense unit e) the hereditary unit.

The senses - the windows of the mind, and the brain centers - for storage and retrieval of sense data, serve as the basis for intellectual activities.

Each of us can apply the principles, outlined in the course, along the lines of our own interests. Generally, the course should prove useful for those engaged in psychological, sociological, political or economic studies.

Assignments & Grading To be arranged with the participants in the course.

Prerequisite None

Campus Sir George Williams and Loyola

BIOLOGY 201 - GENERAL BIOLOGY

(3 credits) - Lectures and Laboratory

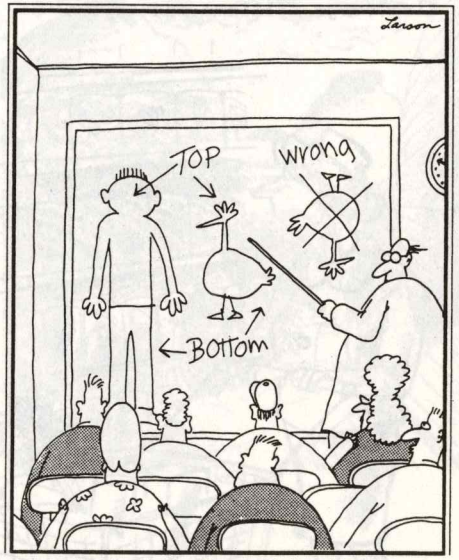
Instructor R. Cronin

Description This survey course introduces the basic principles of biology, the science of life, and of living organisms, their structures, functions and associations. Beginning with the basic chemistry of life in the cell, with its organization and control, the course proceeds through cell associations in tissues, organs and systems as found in the higher plants and animals. The biology of organisms as individuals and in populations and communities are also considered, as well as their origins, evolution, distribution and diversity. The laboratory, an essential part of the course, introduces the proper use of the microscope and dissection instruments through the study of prepared slide preparations, as well as preserved and living animal, plant material.

Assignments & Grading Students are evaluated on lab assignments, quizzes, term-test and final examinations.

Prerequisite None. This course is equivalent to CEGEP Biol 301.

Campus Loyola



People who don't know which end is up.

BIOLOGY 203 - FUNDAMENTAL NUTRITION

(3 credits) - Lectures only

Instructor B. Marcus, N. Ohnona

Description This course, intended for students not in Biology programmes, deals with the physiological and biochemical role of major nutrients such as protein, carbohydrate and fat as well as that of vitamins and minerals. Sources of and requirements for these nutrients will be discussed as well as the concept of energy balance. Modification of nutritional requirements throughout the life cycle (infant nutrition, nutrition for elderly), during athletic training, pregnancy, sickness, weight control programmes and vegetarian dietary regimes are considered.

The development of food habits as well as technology of food preparation and preservation are also described. The main objective of the course is to demonstrate why nutrition is important to maintain good health, and how to apply it daily for your particular situation.

Assignments & Grading Students are evaluated on a mid-term and final exam plus an essay.

Prerequisite None

Campus Sir George Williams and Loyola

BIOLOGY 206 - ELEMENTARY GENETICS

(3 credits) - Lectures only

Instructor C. Beckman

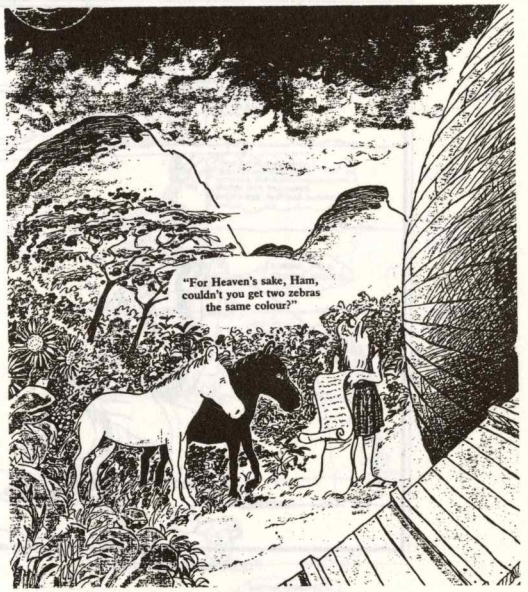
Description This course is intended for non-biology students and consists of a survey of classical, molecular genetics, and evolution. Some emphasis is placed upon the application of the science to human examples, although the student should expect to learn a considerable amount about other organisms. Sequence of Information: Monohybrid and other organism crosses - multiple alleles - sex linkage - bacterial genetics - population genetics-evolution - recent development.

The course content changes each year in order to keep up with new developments.

Assignments & Grading The final grade is based upon two examinations and assignments given during the course.

Prerequisite None

Campus Loyola



BIOLOGY 207 - MICRO-ORGANISMS AND MAN

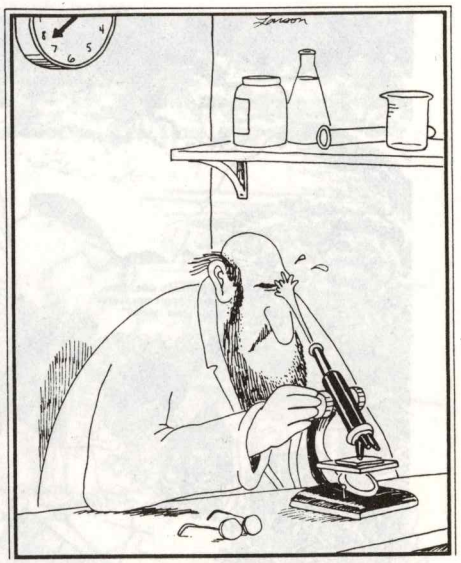
(3 credits) - Lectures only

Instructor S. Fima

Description This course is designed for non-biology students and is intended to provide the student with an elementary understanding of the structure and function of selected viruses, bacteria, protozoa, fungi and algae. The role of these organisms in common human diseases as well as in diseases of agriculturally important plants and animals will be considered. Special problems associated with microorganisms in food production, storage and preservation, will be discussed, in addition to the utilization of microorganisms in the production of pharmaceuticals and vaccines. Industrial uses of micro-organisms, micro-organisms in sewage treatment and water pollution will be presented.

Assignments & Grading T.B.A.

Prerequisite None



Paramecium humor

BIOLOGY 208 - ENVIRONMENTAL BIOLOGY I

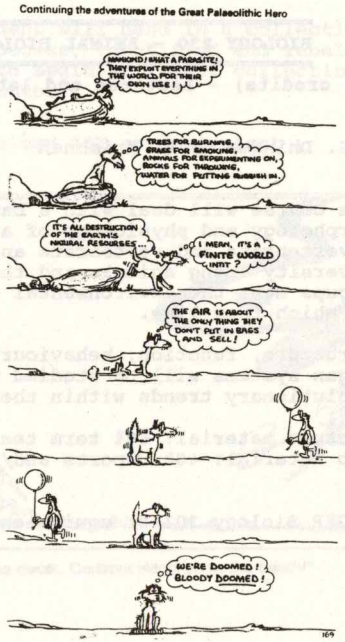
(3 credits) - Lectures only

Instructor M. Maly

Description This course, intended for non-Biology students, considers the various components, living and non-living of natural areas (ecosystems) and their interactions. The effect of man on these areas will also be considered. The ways in which environmental factors affect the numbers and distribution of different plants and animals will be studied. We will investigate the flow of the energy necessary to maintain life in ecosystems, the cycling of materials necessary for survival (nutrients), as well as, the cycling of toxic substances. Some of the properties of communities of different species will be considered. Factors affecting the growth of populations (including the human population) will be discussed.

Assignments & Grading Term test, term paper and final examination.

Prerequisite None


Continuing the adventures of the Great Palaeolithic Hero
WHOOPS! WHAT A PARASITE! THEY EXPLOIT EVERYTHING IN THE WORLD FOR THEIR OWN USE!
TREES FOR BURNING, GRASS FOR SMOKING, ANIMALS FOR EXPERIMENTING ON, ROCKS FOR THROWING, WATER FOR PUTTING RUBBISH IN.
IT'S ALL DESTRUCTION OF THE EARTH'S NATURAL RESOURSES...
I MEAN, IT'S A FINITE WORLD INIT?
THE AIR IS ABOUT THE ONLY THING THEY DON'T PUT IN BAGS AND SELL!
WE'RE DOOMED! BLOODY DOOMED!

BIOLOGY 210 - GENETICS AND HUMAN WELFARE

(3 credits) - Lectures only

Instructor L. Kleinman

Description A course intended for non-Biology students on the principles of heredity as understood by modern biology. It deals also with the application of genetic principles to organisms, including humans. The biological basis of social problems is dealt with at some length. Organic evolution and its implications for human life and welfare are considered.

Assignments & Grading Term test and Final examination

Prerequisite None

BIOLOGY 230 - ANIMAL BIOLOGY

(3 credits) - Lectures and laboratory

Instructor K.S. Dhindsa or K. Krishnan

Description The course will deal with a basic study of the morphology and physiology of a selected series of invertebrate and vertebrate animals, stressing the diversity among animals and the means by which animal groups meet the environmental demands of the habitat in which they live.

Structure, function, behaviour and integration of organ systems will be studied with emphasis placed on evolutionary trends within the major animal phyla.

Assignments & Grading Lecture material: 60% term test(s) and final exam
Lab material: 40% reports and/or lab practical.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 232 - ENTOMOLOGY I

(3 credits) - Lectures and Laboratory

Instructor P.J. Albert

Description An introduction to the study of insects. Basic classification, morphology, anatomy, and some physiology. Topics will be discussed as follows:

Introduction: Classification: Protura, Thysaneura, Diplura, Collembola, Embioptera, Plecoptera, Psocoptera, Dermaptera, Ephemeroptera, Orthoptera, Zoraptera, Mallophaga, Anoplura, Thysanoptera, Hemiptera, Homoptera, Coleoptera, Strepsiptera, Mecoptera, Neuroptera, Trichoptera, Lepidoptera, Diptera, Siphonaptera, Hymenoptera.

Morphology: Outer covering, cuticle, external processes of body wall segmentation. Insect head, types, antennae, mouthparts and modifications. Thorax, legs, wings, locomotion. Abdomen, reproductive appendages.

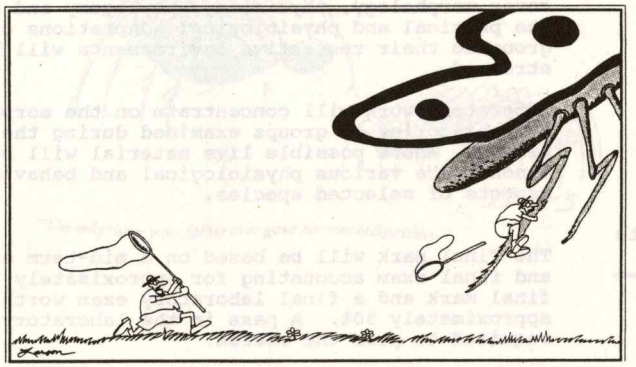
Insect metamorphosis - types.

Anatomy: Alimentary canal, excretory and circulatory systems, reproductive and central nervous systems,sensory systems.

Laboratory sessions will deal with morphology, anatomy and classification.

Each student will hand in a collection of 50 different insect species, identified and labelled. Students are advised to begin an insect collection during the summer months.

Prerequisite CEGEP Biology 301 or equivalent



"To the death, Carlson! Hang on to the death!"

BIOLOGY 233 - ENTOMOLOGY II

(3 credits) - Lectures and Seminars

Instructor P.J. Albert

Description This course deals with insect physiology and behaviour. It emphasizes the relationships between structure and function of various insect parts. The lecture topics will include the following: Introduction to insect behaviour, vision, gustation, olfaction, pheromones, hormones light production, sound production and perception, social behaviour, diapause, migration and insect control.

Assignments & Grading The final grade will be a combination of marks from the following: midterm test, seminars, final exam. The values for each of these will be determined at the first lecture.

Prerequisite Entomology I (Biology 232)

BIOLOGY 234 - INVERTEBRATE ZOOLOGY I

(3 credits) - Lectures and Laboratory

Instructor J.D. McLaughlin

Description The course involves a detailed examination of the lower (non-coelomate) invertebrates. Lectures will cover morphology, physiology, phylogeny and evolution. The physical and physiological adaptations of each group to their respective environments will be stressed.

Laboratory work will concentrate on the morphology and life histories of groups examined during the lecture period. Where possible live material will be used to demonstrate various physiological and behavioral aspects of selected species.

Assignments & Grading The final mark will be based on a mid-term exam and final exam accounting for approximately 70% of the final mark and a final laboratory exam worth approximately 30%. A pass in the laboratory exam is required to pass the course.

Prerequisite CEGEP Biology 301 or equivalent

Please Note This course will not be offered 1990-91.

BIOLOGY 235 - INVERTEBRATE ZOOLOGY II

(3 credits) - Lectures and Laboratory

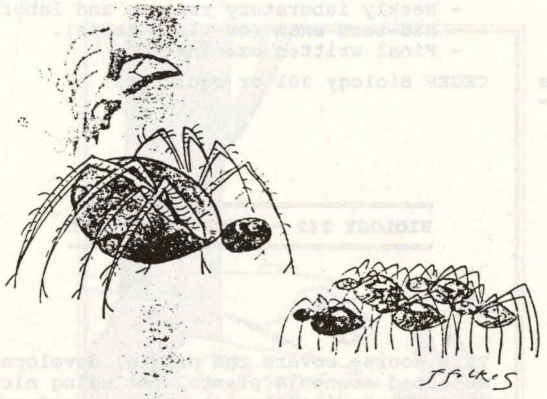
Instructor T.B.A.

Description This course is designed to follow Biology C234 and has minimal overlap with General Zoology. The subject matter deals with the coelomate invertebrates, i.e. the Annelids, Molluscs, Arthropods (excluding insects), Echinoderms and if time permits, other minor groups. Lectures will cover morphology, some physiology and adaptive radiation in the various groups.

Laboratory work will concentrate on the morphology of selected representatives and will be based largely on dissections. Where possible, living specimens will be used to illustrate the mechanics of locomotion, filter feeding, etc.

Assignments & Grading The final mark will be based on a mid-term and on a final exam accounting for approximately 70% of the final mark, and a final lab exam worth approximately 30%. A pass in the laboratory exam is required to pass the course.

Prerequisite Biology 234 or Biology 230



"The only thing your father ever gave me was indigestion."

BIOLOGY 240 - PLANT BIOLOGY

(3 credits) - Lectures and Laboratory

Instructor B.S. Mangat or R.K. Ibrahim

Description An introductory lecture and laboratory course designed to acquaint students with the biology of plants. The course emphasizes the following areas:

- Structure of the plant cell and its organelles; types of permanent cells and tissues; their distribution and function.
- Morphological modifications of roots, stems, leaves and flowers.
- Distribution of tissues in different organs of the plant in relation to the physiological role(s) of each organ.
- A study of the physiological processes of plants including water relations, transpiration, respiration, photosynthesis and translocation.
- Physiology of plant growth with emphasis on the role of phytohormones in regulating plant growth and development.
- Diversity in the plant kingdom as represented by examples from the algae, fungi, bryophytes, ferns and seed plants; their life-cycles and their ecological/economic significance are emphasized.

Assignments & Grading The final grade will be distributed among the following:

- Weekly laboratory reports and laboratory tests.
- Mid-term exam (or class tests).
- Final written examination.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 242 - ECONOMIC BOTANY

Instructor T.B.A.

Description This course covers the origin, development and use selected economic plants, including microorganisms. Their historical impact, prospects for future use, and importance to the Canadian economy are stressed, as well as world-wide problems for food and alimentation.

Assignments & Grading T.B.A.

Prerequisite CEGEP Biology 301 or equivalent.

Please Note Not offered in 1990-91.

BIOLOGY 250 - FUNDAMENTALS OF ECOLOGY

(3 credits) - Lectures only

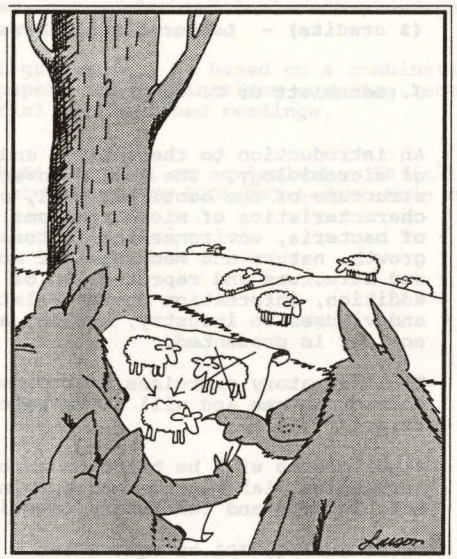
Instructor E. Maly

Description An introduction to the basic principles of ecology. This course illustrates how environmental factors determine distribution and abundance of plants and animals in different ecosystems.

Topics discussed include the abiotic environment (water, air, climate, soil), production and community energetics, community structure, nutrient cycling, single species population characteristics and population regulation, competition, predation. Representative habitats such as forest, tundra, deserts, grasslands, lakes and streams, the ocean coast are studied to illustrate special adaptations. This course serves to introduce the basic concepts in ecology and is prerequisite for most other ecology courses. In addition to teaching basic concepts, the course is designed to outline practical implications of ecology.

Assignments & Grading Mid-term test and final examination.

Prerequisite CEGEP Biology 301 or equivalent



Natural selection at work

BIOLOGY 261 - GENETICS

(3 credits) - Lectures and Laboratory

Instructors C. Beckman

Description A course to illustrate the fundamental principles of inheritance in plants, animals and microorganisms. Mitosis, meiosis, genetics, gene linkage and mutation will be covered. The role of DNA as the hereditary material and genetic code will be studied in detail, as will the mechanisms of DNA, RNA and protein synthesis. There is also an introduction to bacterial genetics and to population genetics.

Assignments & Grading Examinations will test the problem-solving ability of the student with respect to exercises in Mendelian, introductory molecular and population genetics. Regular laboratory reports are required.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 270 - INTRODUCTORY MICROBIOLOGY

(3 credits) - Lectures and Laboratory

Instructor J. Kornblatt or C. Cupples

Description An introduction to theoretical and applied aspects of microbiology. The topics covered include the fine structure of the bacterial cell, staining characteristics of microorganisms, kinetics of growth of bacteria, environmental factors affecting bacterial growth, nature and mechanism of action of antibiotics, and structure and reproduction of viruses. In addition, information on the relationships of bacteria and viruses to industry, health, agriculture and ecology is presented.

The laboratory exercises introduce methods of handling microorganisms and will illustrate the lecture material.

Assignments Final grades will be based on a combination of termpapers, lab reports and examinations covering both lecture and laboratory material.

Prerequisite CEGEP Biology 301 or equivalent

BIOLOGY 298 - SELECTED TOPICS IN BIOLOGY

(3 credits)

The following special topics courses will be given in the 1990-91 year. Special topics courses can be applied to the various subject areas, according to their titles. Thus, "BIOL 298A - Selected topics in cell and molecular biology; Introductory Genetics II" would be credited as a cell and molecular biology course. In all cases, the first part of the title will indicate the subject area.

298A/4 - SELECTED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - Introductory Genetics II

Instructor R. Storms

Description A course to illustrate the principles of genetics. This course will further develop the principles introduced in Biology 261. Emphasis will be placed on developing an understanding at the molecular level of the following topics; DNA and chromosome structure and replication, gene regulation, mutation, DNA damage and repair, extrachromosomal elements, and genetic engineering.

Assignments & Grading Final grades will be based on a combination of termpapers and examinations covering lecture material and assigned readings.

Prerequisite CEGEP Biology 301 or equivalent. It is recommended that students take BIOL 261 before this course.

BIOLOGY 320 - HISTORY OF BIOLOGY

(3 credits) - Lectures only

Instructor C. Jacobs

Description This course traces the development of biological thought and discussion from the naturalistic approach of pre- and early historic times to the synthetic and processual approach of modern times. Emphasis will not be on who, what, when, and where, but rather on recognizing the importance of social, religious, economic and political factors that together shaped the scientists and constrained the questions that they asked.

Assignments & Grading There will be several in-class assignments as well as a midterm and final which are both essay exams.

Prerequisite Any 12 credits in biology

BIOLOGY 321 - EVOLUTION

(3 credits) - Lectures only

Instructor C. Jacobs

Description The course will begin by explaining evolutionary principles of macroevolution and continue by examining these principles in light of a particular taxon, the Hominids, of which our species, Homo Sapiens, is the sole surviving member. Emphasis will be on the interaction of environment, behaviour, and biology at each of the various stages of human evolution.

Assignments & Grading Grades will be based on a midterm, final, and several in-class assignments.

Prerequisite Any 12 credits in biology.

BIOLOGY 322 - BIOSTATISTICS

(3 credits) - Lectures and Laboratory

Instructor D. Fairbairn

Description This course explores the application of statistical methods to biological data, and emphasizes the integration of statistical methods and experimental design in hypothesis testing. Materials covered include: basic experimental design; descriptive statistics for central tendency and dispersion; frequency distributions; statistical inference and hypothesis testing; the normal, Poisson, and binomial distributions; Student's t; Analysis of Variance, Correlation and Regression; Chi-square; various non-parametric alternatives for 2 sample tests, ANOVA, and correlation.

Assignments & Grading Students are evaluated on the basis of midterm and final exams; lab assignments, quizzes, and final laboratory exam.

Prerequisite Nine Biology credits in a Biology Major, Specialization or Honours programme.

BIOLOGY 323 - BIOLOGY OF AGING

(3 credits) - Lectures only

Instructor H. Enesco

Description In this course we will ask many questions: What are the differences between organisms which age and those which do not? What physiological changes take place in aging? Has there been selection for or against aging in the course of evolution? What are the cellular changes which take place in aging? Does aging change cell division potential?

With this background we will examine what factors may influence lifespan, such as diet, exercise, chemicals. We will examine some of the theories which have been put forward to explain aging, the extent to which molecular repair capability affects aging, and the role of the nervous system in aging.

Assignments & Grading Short term-papers are required. Seminars may be required. Mid-term and final examination.

Prerequisite Biology 230 and 261

BIOLOGY 330 - BIOLOGY OF THE VERTEBRATES

(3 credits) - Lectures only

Instructor K.S. Dhindsa

Description A survey of the fishes, amphibians, reptiles, and mammals. Emphasis will be placed on phylogeny of the groups and the adaptation that fits them to their environments. Topics will include zoogeography, physiology, communication and reproduction.

Assignments & Grading Term tests and Final Examination

Prerequisite Biology 230

Please Note This course will not be offered 1990-91.

BIOLOGY 331 - COMPARATIVE VERTEBRATE ANATOMY

(6 credits) - Lectures and Laboratory

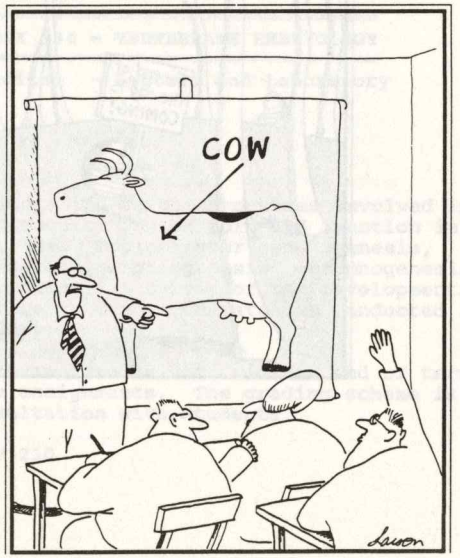
Instructor K.S. Dhindsa

Description A comprehensive study of the anatomy, development and evolution of vertebrate systems, from the lower chordates through the Agnathas, fishes, amphibians and the reptiles to the birds and mammals. Comparative anatomical changes are correlated with the adaptive radiation, evolutionary trends and biological/ ecological systems of chordates. The lectures begin with an introduction to the nature, principles, domain of comparative anatomy and vertebrate pedigree. The comparative study of the vertebrate organ systems for the various groups discussed are: integument and its derivatives, supporting tissue and the skeleton, muscles, body cavities, respiratory structures, alimentary systems, excretory and reproductive systems, circulatory systems, sense organs, nervous system, endocrine glands.

The laboratories involve extensive morphological study and general survey of the major groups of chordates. Comparative study of the vertebrate systems through dissections (molgula, lamprey, shark, turtle, pigeon and the cat), series of skeletons, prepared slides, preserved and mounted dissected specimens.

Assignments & Grading Grades are compiled from the results of periodic quizzes, laboratory and demonstration plus midterm- and final laboratory and theory examinations.

Prerequisite Biology 230



"Yes ... I believe there's a question there in the back."

BIOLOGY 332 - PARASITOLOGY

(3 credits) - Lectures and Laboratory

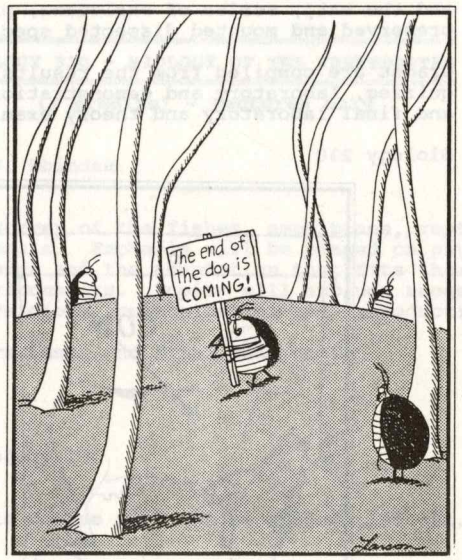
Instructor J.D. McLaughlin

Description The course will give some insight into the scope of Parasitology. A representative sample of parasites from the following Phyla will be studied with special reference to the parasites of man: Protozoa (Sarcodina, Sporozoa, Flagellata and Ciliata), Platyhelminthes, Nematoda and Acanthocephala along with a brief look at the Arthropoda. Lecture material will be supplemented in the laboratory by the study of prepared slides. Students will also have an opportunity to study the phenomenon of parasitism by carrying out a systematic parasitological examination (necropsy) of a frog. Parasites recovered will provide material for staining and mounting techniques.

Assignments & Grading Term test, final exam and final lab exam. A pass in the lab exam is required to pass the course.

Prerequisite Six credits of Zoology courses. Biology 230 or equivalent must be completed before enroling in this course.

Please Note This course will not be offered 1990-91.



BIOLOGY 333 - ANIMAL PHYSIOLOGY

(6 credits) - Lectures and Laboratory

Instructor N.N. Kapoor

Description A study of the mechanisms by which the activities of major organ systems are co-ordinated and regulated for the survival of animals, particularly vertebrates. Some basic physiological phenomena related to the organ system activities are discussed.

The laboratories are designed to develop a student's awareness of quantitative approaches in physiology and to introduce students to some simple surgical techniques and basic instrumentation. Various laboratory exercises, demonstrations and projects relate to system physiology in animals. Students are encouraged to gain information from various sources. Some laboratories may include student's participation in seminars.

Assignments Laboratories are important and form an integral part of the course. A good lab report is expected. Laboratory assignments may also include seminars. Examination question papers include material covered in lectures, assigned readings and laboratories. Examination format may be either multiple choice, short answers, essay type or a combination thereof. Grades are based on lab reports mid-term and final examination.

Prerequisite Biology 230 and CHEM 271

BIOLOGY 334 - VERTEBRATE EMBRYOLOGY

(3 credits) - Lecture and Laboratory

Instructor R. Cronin

Description An introduction to the processes involved in the orderly acquisition of form and function in developing vertebrates. Topics cover gametogenesis, fertilization, organogenesis, morophogenesis and metamorphosis. A survey of the developmental anatomy of representative vertebrates is conducted in the laboratory.

Assignments & Grading Theory exams are held in mid and end of term. There are lab assignments. The grading scheme is determined in consultation with students.

Prerequisite Biology 230

BIOLOGY 335 - HISTOLOGY I

(3 credits) - Lectures and Laboratory

Instructor S.M. Ruby or K.S. Dhindsa

Description This course consists of a microscopic study of the organization into basic tissue types. The histology of tissues will be examined at the ultrastructural, histo-chemical and physiological levels and these features will be related to the functioning of the various tissue forms. Epithelium, connective tissues, including areolar adipose, reticular, elastic tissue, cartilage and bone, muscle, nervous and vascular connective tissue will be studied in depth and the student will be introduced to the basic concept of organization of tissues into organs and organ systems.

Assignments & Grading Written and laboratory examinations.

Prerequisite Biology 230

BIOLOGY 336 - HISTOLOGY II

(3 credits) - Lectures and Laboratory

Instructor S.M. Ruby

Description This course deals with the organization of the basic tissues into organs and organ systems. It will include the following systems: digestive system and associated glands (liver, pancreas and salivary glands), respiratory, excretory, endocrine, reproductive and haemopoietic systems. The functioning of these systems in relation to these histological structures will be stressed. Wherever possible the comparative aspects of various organs throughout the vertebrates will be examined.

Assignments & Grading Written and laboratory examinations.

Prerequisite Biology 335; Biology 331 recommended

BIOLOGY 341 - BIOLOGY OF THE FUNGI

(3 credits) - Lectures and Laboratory

Instructor P. Widden

Description This course will trace the history of the subject, the importance of fungi to man and the significance of fungi as ecological agents. The structure, organization, development, nutrition, growth and reproduction of the thallus will be described. The classification of the fungi will be discussed through the study of the structure and life cycles of representative examples. The role of fungi in industrial processes, in the food industry, as pathogens of plants and animals and as agents of decomposition in the ecosystem will be stressed throughout the course. The course will consist of lectures, laboratory sessions in which selected examples of the fungi will be studied and a week-end mushroom foray in which all students will be expected to participate.

Assignments & Grading Lab reports, mid-term and final examinations.

Prerequisite Biology 270

"**Clam chowder—Ingredients**: clams, potatoes, water, hydrolated plant protein, sodium phosphate, calcium carbonate, butylated hydroxytoluene. For external use only."

BIOLOGY 344 - BIOLOGY OF ALGAE

(3 credits) - Lectures and Laboratory

Instructor S. S. Ashtakala

Description A study of the morphological, physiological, and ecological diversity of algae with emphasis on the distinguishing characteristics of each major group. Topics include the commercial and industrial uses of algae, the use of algae as pollution indicators and the influence of algae on the environment. Laboratories are designed to enable the student to collect, identify and quantify algae specimens from fresh water ecosystems. The physiology of representative cultured algae will also be examined.

Assignments & Grading

Lab reports and projects	20%
Mid-term Examination	20%
Final Examination	60%

Prerequisite Biology 240

BIOLOGY 345 - HORTICULTURAL SCIENCE

(3 credits) - Lectures only

Instructor S.S. Ashtakala

Description The scientific concepts of horticulture are emphasized. The subject material is organized into 3 main categories: Biology of Horticulture, Technology of Horticulture (control of plant growth and development at will) and Topics of Current Interest. These include: Increasing the biological efficiency of crops, use of controlled environments for crop production, breeding plants for extreme temperature, drought and other types of stress (pollutants) tolerance, large scale in vitro and other methods of vegetative propagation, new techniques in plant breeding and production of high-protein plants and production of petroleum plantations for fuel and energy.

Assignments & Grading Mid-term test, seminar, essay and final examination

Prerequisite Biology 240

BIOLOGY 346 - PHYSIOLOGY OF PLANT DEVELOPMENT

(3 credits) - Lectures and Laboratory

Instructor B. Mangat

Description Physiological and biochemical aspects of plant growth and development. Plant responses to growth regulators, their mode of action and their use in plant tissue culture. The role of light and temperature in seed germination, dormancy and flowering. Lectures and laboratory.

Assignments & Grading Mid-term test, Seminar topic and Final Examination

Prerequisite Biology 240

BIOLOGY 347 - PLANT ANATOMY

(3 credits) - Lectures and Laboratory

Instructor S.S. Ashtakala

Description The objectives of the course are to present the structure of plants, the origin of tissues and organs, and their ontogeny. The first part of the course deals mainly with the structural specialization of cells and tissues in relation to their functions. These tissues are later treated as components of plant organs such as root, stem, leaf, etc. The basic processes which underlie their growth, development and differentiation are also discussed. Topics include morphological, developmental, pathological, ecological and economic aspects of anatomy as well as their applications in horticulture such as pruning, grafting and healing of the plants.

Laboratory work requires the preparation of permanent slides and free-hand and microtome sections using 4-5 staining schedules.

Assignments & Grading

Laboratory work:	Lab quizzes	10%
	Lab test	10%
	Weekly lab work and preparation of slides	10%
Mid-term examination		20%
Final examination		50%

Prerequisite Biology 240

BIOLOGY 349 - PLANT NUTRITION AND METABOLISM

(3 credits) - Lectures and Laboratory

Instructor S. Ashtakala

Description A study of the physiological processes of higher plants relating to water relation, mineral nutrition, photosynthesis, carbohydrate and nitrogen metabolism. These processes are discussed in relation to the environmental factors which govern them.

Assignments & Grading T.B.A.

Prerequisite Biology 240

BIOLOGY 352 - PLANT FIELD ECOLOGY

(3 credits) - Field course

Instructor P. Widden

Description This course is normally offered during the last two weeks of August at the Lacolle Centre. Students are expected to live at the centre for the entire 2-week period. The course will involve the identification of local plant species and the collection and preservation of specimens. The use of relevée analysis, quadrat sampling, line and belt transects and vegetation mapping methods in describing plant communities will be demonstrated. The application of statistical methods to quantitative data on species populations will also be discussed. The course will consist of formal lectures, informal discussion groups, organised field work, individual projects, and an excursion into the Adirondacks to look at plant communities in the mountains.

Assignments & Grading Students will be required to hand in a written report and a pressed plant collection on completion of the course.

Prerequisite Biology 240, 250 and 322

Campus SGW (Lacolle Centre)

BIOLOGY 355 - FUNDAMENTALS OF LIMNOLOGY

(3 credits) - Lectures only

Instructor G. Leduc

Description An introduction to the study of inland water ecosystems with an emphasis on the physical, chemical, and biological features of lakes. Topics include formation and type of lake basins, optical and thermal properties of lakes, distribution and cycling of major nutrients, a description of the major taxa inhibiting lake ecosystems and the factors affecting community structure in lakes. Other topics will include the features of specialized lakes (e.g. inland saline lakes), pollutants, and eutrophication. The course will consist of lectures and informal discussion.

Assignments & Grading Evaluation is based upon a mid-term exam, a final exam, and written assignments.

Prerequisite Biology 250

BIOLOGY 356 - MICROBIAL ECOLOGY

(3 credits) - Lectures and Laboratories

Instructor D. Ahmad

Description The course is designed to give an understanding of the environments in which microbes live, the structure and organization of microbial communities and the interactions between different groups of microorganisms. Topics discussed will include the structure of soils, water relations, nutrient supply, the role of microorganisms in the degradation of organic substances, nutrient cycling, microbial symbioses, parasitism and predation, microbial succession and the relative contributions of different taxonomic groups to the decomposition process. The major stress will be on terrestrial organisms, but some time will be devoted to the discussion of aquatic systems. The course will consist of lectures, student seminars, informal discussion and an integrated laboratory project.

Assignments & Grading Grading is based on formal laboratory reports, a mid-term and final theory examination and on a seminar presentation.

Prerequisite Biology 250 and 270

BIOLOGY 358 - INTRODUCTION TO ANIMAL BEHAVIOUR

(3 credits) - Lectures and Tutorials

Instructor L.-A. Giraldeau

Description An introduction to behaviour with emphasis on the proximate causes of behaviour as well as its evolutionary significance.

Topics will include perception, learning, communication, homing, development, genetics, innate motor patterns and behaviour cycles.

Assignments & Grading Midterm and Final Examination plus, participation to tutorials and term papers.

Prerequisite Biology 250

BIOLOGY 359 - EVOLUTIONARY ECOLOGY

(3 credits) - Lectures

Instructor D. Fairbairn

Description This course covers current topics in evolutionary ecology. The aim of the course is to provide students with the knowledge and ability to understand and critically evaluate evolutionary hypotheses in ecology and behaviour. Mechanisms of adequately testing such hypotheses are also considered.

The emphasis is on case studies of topics of current interest, and therefore the course content may vary from year to year. We begin with a formal review of the meaning and mechanisms of natural selection and evolution. We briefly consider issues such as genetic versus non-genetic variability, the efficiency of selection, and the unit of selection. This introductory section is followed by case studies which analyze the adaptive significance and evolution of various ecological traits and processes. In this section we discuss topics such as mimicry, mutualism, coevolution, senescence, body size, sex ratio, sexual reproduction, sexual size ratio, and wing reduction in insects.

Assignments & Grading Students are evaluated on the basis of midterm and final exams plus one essay.

Prerequisite Biology 250

BIOLOGY 363 - GENETICS OF HIGHER ORGANISMS

(3 credits) - Lectures only

Instructor C. Beckman

Description The aim of this course is to study in some detail the theoretical and practical principles of genetics and how these apply to the study of genetic variation. The first part of this course will include cytogenetics: chromosomal abnormalities and how these are used in genetic research. Somatic cell genetics has been a major tool for mapping of the human genome. Thus, this technique and its application in this area of research will be studied. Other broad themes to be considered will include multifactoral inheritance, the genetics of cancer and some population genetics.

Assignments & Grading 100% of the final grade will be based on the mid-term and final exam. These will be made up of essay and short answer questions.

Prerequisite Biology 261. A knowledge of biochemistry would be an asset but is not essential for this course.

Please Note This course will not be offered in 1990-91.

BIOLOGY 364 - CELL PHYSIOLOGY

(3 credits) - Lectures and Laboratory

Instructor R.M. Roy

Description A course in which cellular function and cellular response to the environment are surveyed. The course concentrates on: i. assembly of biological structures; ii. biological membranes, their structure and permeability properties; iii. transport across biological membranes, transport and nerve function, transport and muscle function; iv. biological energy production, mitochondrial "ox-phos", chloroplast-photophosphorylation, bacterial systems, the proton pumps of all cells; cellular movement, communication among cells, response to stresses (temperature, pressure and radiation).

Assignments & Grading Laboratory reports (40%), mid-term tests (20%) and final exam (40%).

Prerequisite Chemistry 222, and 30 credits in Biology or Biochemistry program. It is recommended that students take Introductory Biochemistry (Chem 271) before or during this course.

BIOLOGY 365 - CYTOLOGY

(3 credits) - Lectures and Laboratory

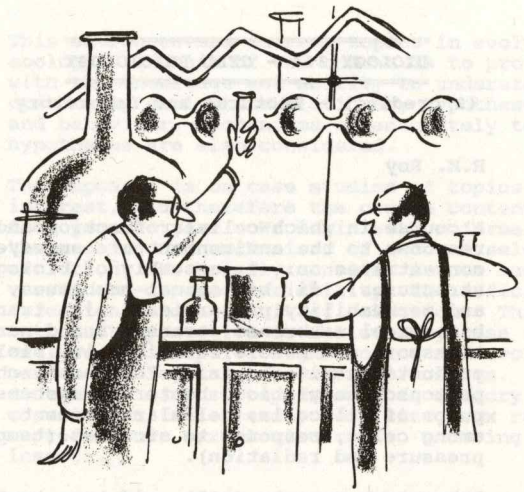
Instructor H.E. Enesco

Description The objective of this course is to reach an understanding of the correlation between structure and function in plant and animal cells, based on electron microscopic, cytochemical and biochemical analysis. Chromosome structure as well as cell organelles, including lysosomes, Golgi apparatus, mitochondria, chloroplasts, ribosomes and membranes are analyzed in relation to the functional activities of the cell.

While the laboratory is devoted to the preparation, observation, measurement and comparison of cells and cell products at light microscope levels, the lectures concentrate upon features and functions revealed by the electron microscope and biochemical and molecular methods of analyses. Cell division, differentiation and inter-communication are considered.

Assignments & Grading Regular laboratory reports are required. Lab quizzes, mid term and final exam.

Prerequisite Chemistry 222, and 2nd Year Standing



"What's that funny little word you shout when you've made a major breakthrough?"

BIOLOGY 370 - INTERMEDIATE MICROBIOLOGY

(3 credits) - Lectures only

Instructor J. Fraser

Description This course is designed to follow Biology 270 and will deal primarily with applied and environmental microbiology. The topics covered will include fermentation and its industrial development; the production of primary and secondary metabolites (antibiotic production); biotransformations of chemicals and production of non-microbial substances by genetically engineered microorganisms. The use of microbes to degrade environmental wastes will also be discussed.

Prerequisite Biology 270 and Chemistry 222; Chemistry 271 Recommended

BIOLOGY 380 - NUTRITION

(3 credits) - Lectures only

Instructors S. Skelton

Description This course provides an introduction to the science of nutrition through the study of the metabolism, utilization, and functions of all essential nutrients: proteins, lipids, carbohydrates, vitamins, minerals, fiber and water. Nutritional needs throughout the life cycle are studied and some of the methods available to evaluate the nutritional status of individuals are reviewed. The influence of environmental factors on nutrient intake is discussed, and the consequences of dietary deficiencies are examined.

Assignments & Grading Mid-term and/or essay and final exam

Prerequisite Chemistry 222; Chemistry 271 recommended

BIOLOGY 381 - BIOLOGY OF POLLUTANTS

Instructor G. Leduc

Description This course studies the impact of pollution on ecosystems. The major classes of pollutants will be considered with regards to their nature, origin, distribution but mostly, their mode of action on individual organisms and ecosystems. Air, water and soil will be examined with their respective pollutants and a major emphasis will be given to quantitative assessments of various agents and their effects. The course will also include theoretical and practical aspects of bioassays and their environmental application.

Assignments & Grading Evaluation of students is based on a case study and on mid-term/final examinations.

Prerequisite 250 previously or concurrently

Please Note This course was listed under BIOL 398C/2, lecture AA in the 1989-90 Undergraduate Class Schedule. Students having taken BIOL 398C/2, lecture AA (1989-90) will not be given credit for this course.

BIOLOGY 398 - INTERMEDIATE TOPICS IN BIOLOGY

(3 credits)

The following special topics courses will be given in the 1990-91 year. Special topics courses can be applied to the various subject areas, according to their titles. Thus, "BIOL 398A - Selected topics in ecology; Intermediate Concepts in Ecology" would be credited as an ecology course. In all cases, the first part of the title will indicate the subject area.

398A/4 - INTERMEDIATE TOPICS IN ECOLOGY
Subject - Intermediate Concepts in Ecology

Instructor M. Maly

Description This course discusses adaptation (in the broadest sense) to the environment: biotic and abiotic. Major topics include response of organisms to temperature, water, oxygen, light and interspecific interactions. Physiological mechanisms will be emphasized.

Assignments & Grading Term paper, midterm and final examinations.

Prerequisite Biology 250 previously or concurrently

Please Note Students who have taken Biology 353 (Intermediate Ecology) are discouraged from taking this course.

"Is it your protective coloring, or have you been avoiding me late'

398B/4 - INTERMEDIATE TOPICS IN BIOLOGY
Subject - Late Quaternary Paleoecology

Instructor G. Leduc

Description This course is an introduction to the study of environmental reconstruction of terrestrial and lake ecosystems. From physical, chemical and biological analysis of lake sediments cores the past vegetation history of a watershed and of aquatic productivity are reconstructed. Climate changes, landscape disturbance in prehistorical/historical periods and modern pollution events are also inferred from the sedimentology. Major emphasis will be given to Northeastern North America from the postglacial times to the present.

The classes consist of a series of introductory lectures followed by seminar sessions at which students give presentations based on the recent research literature.

Grading

Seminar	10
Class participation and other	10
Research project	30
Final Exam	50
	100

Prerequisite No prerequisite required, but prior courses in general Ecology and Limnology are desirable.

Please Note This course will not be offered in 1990-91.

398D - INTERMEDIATE TOPICS IN BIOLOGY
Subject - Microbial Genetics

Instructor M. Herrington

Description The use of mutant microorganisms is important both for the study of the growth and development of the organism, and for the engineering of microorganisms to produce commercially useful products. In this course we will discuss the isolation and genetic and molecular characterization of mutant strains of microorganisms. Methods of induction, isolation and mapping of mutations will be discussed. These include methods using recombinant DNA technology as well as traditional methods. Examples will be taken from the current literature. A reading list will be provided but there will be no text book for the course. The final grade will be based on examinations, assignments and class participation.

Prerequisites Biology 270 and Biology 261. This course cannot be taken for credit if you have taken Biology 460.

BIOLOGY 420 - RADIATION BIOLOGY AND RADIOTRACER METHODOLOGY

(3 credits) - Lectures and Laboratory

Instructor R.M. Roy

Description This course attempts to provide students in the biological sciences with a basic understanding of the properties of ionizing radiation and its interaction with matter. The production and characteristics of X-rays and techniques of detecting radiation or measuring radiation dose are discussed in detail. The theoretical background and the practical techniques of utilizing the following detectors are presented: geiger counter, gas-flow proportional counter, solid and liquid scintillation counter. The procedures for handling radioisotopes and labelled compounds are discussed.

The effects of ionizing radiation on water and free radical production will be considered. The biological effects of ionizing radiation at the biochemical, cellular, organismal and ecological level will be discussed in detail. Special emphasis will be given to DNA damage, repair processes, cell survival, immune responses, mutagenesis and carcinogenesis.

Laboratories will illustrate the properties of ionizing radiation, operation of X-ray equipment, measurement of radiation dose, operation of various types of counters, and the biochemical and physiological responses of mammalian cells to radiation.

Assignments & Grading Grades are largely based on lab reports (60%) and an essay-type final exam (30%); 10% of the final grade is based on lab and lecture participation.

Prerequisite Biology 261 and 364

BIOLOGY 431 - BIOLOGY OF FISHES

(3 credits) - Lectures and Laboratories

Instructor J. Grant

Description A broad introduction to the biology of fishes including the diversity of species living in freshwater and marine environments. Lecture topics will cover systematics, evolution, anatomy, physiology, behaviour, ecology and fisheries management.

Laboratory work includes dissecting representative specimens, identifying local freshwater fishes, a field trip to the Montreal Aquarium and experimenting with live fishes.

Assignments & Grading Students will be required to present a seminar on a current topic of interest in fish biology, to complete laboratory assignments and to write a major term paper. There will also be a midterm and final examination.

Prerequisite Biology 230, 250, 322 and 330 or 331.

"It started with the remoras, but then I picked up a catfish, a few rays, an eel, some perch . . ."

BIOLOGY 432 - COMPARATIVE AND ENVIRONMENTAL PHYSIOLOGY

(3 credits) - Lectures only

Instructor

Description The primary theme of this course is the physiological interrelationships between animals, and their environments. A comparative study of selected physiological processes in diverse phyla, dealing with behavioural and physiological adaptations in animals. Lectures and seminars.

Assignments & Grading T.B.A.

Prerequisite Biology 333

Please Note Not offered in 1990-91

BIOLOGY 435 - ADVANCED PARASITOLOGY

This course is under review with the Curriculum Committee and may be removed from the Calendar. It is not offered in 1990-91.

BIOLOGY 436 - BIOLOGY OF MAMMALS

(3 credits) - Lectures only

Instructor T.B.A.

Description A course dealing with the biology of the Mammalia. Topics to be discussed include: Theories as to the origin of the mammals, characteristics of the major orders (principally those found in North America). The distribution, ecology and adaptations to environmental conditions will be examined for some species.

Assignments & Grading A term paper on a subject chosen in consultation with the instructor is required. Grading is based on this term paper and two examinations.

Prerequisite Biology 330 and 3rd year standing

Please Note This course will not be offered in 1990-91.

BIOLOGY 441 - PLANT BIOCHEMISTRY

(3 credits) - Lectures only

Instructor R.K. Ibrahim

Description A lecture course dealing with the biochemistry of natural constituents unique to plants with emphasis on secondary metabolites; their biosynthetic origin and transformations; their "raison d'etre", enzymology and functional significance.

The course starts with a review of the metabolic activities of plant cells and the role(s) of intermediate metabolites in the biosynthesis of natural plant products, then proceeds to deal with the following topics:

- Cellulose, hemicellulose and pectins; their assembly and mechanism of cell wall growth; algal cell wall polysaccharides and gel-forming substances.
- Origin of aromatic rings in plants; review of plant phenolic compounds including phenylpropanoids, lignins, tannins, flavonoids and cyanic pigments; enzymes and regulation of phenolic metabolism.
- Biosynthesis of terpenoid compounds; variety and role of volatile oils, abscisic acid, gibberellins, sterols, cardiac glycosides, carotenoids and rubber.
- Nitrogen metabolism and origin of alkaloids; review of the most important groups of alkaloids with reference to their economic and pharmacologic significance.
- Plant tissue and cell cultures and its potential in the production of secondary plant products and biotransformation studies.

Assignments & Grading Final grade is divided among the following: Two or three assignments, and a final examination.

Prerequisite Chemistry 271

BIOLOGY 452 - ECOLOGICAL GENETICS

(3 credits) - Lecture and Seminars

Instructor D. Fairbairn

Description This course explores the interface between population ecology, population genetics, and evolution. Topics covered include: methods of detecting genetic variation in natural populations; patterns of genetic variation in natural populations; adaptation, fitness and selection; migration and gene flow; mutation; quantitative inheritance; population structure; maintenance of genetic variation in natural populations; genetic load; classical, balance, and neo-classical theories; the species concept; and mechanisms of speciation.

Assignments & Grading Students are evaluated on the basis of midterm and final exams, an essay and a seminar presentation.

Prerequisites Biology 250, 261 and 322, or permission of the Instructor

BIOLOGY - 453 - BEHAVIOURAL ECOLOGY AND SOCIOBIOLOGY

(3 credits) - Lectures and Tutorials

Instructor L.-A. Giraldeau

Description A survey of the ecological aspects of behaviour and the underlying biological basis of social behaviour in both vertebrates and invertebrates.

Topics include simple optimality and evolutionarily stable strategies, foraging theory, territoriality, aggression, mate selection, mating systems, parental care, altruistic behaviour, kin selection and group selection.

Assignments & Grading Mid-terms and Final Examination, participation to tutorials.

Prerequisite Biology 250 and 358

Please Note If you have taken BIOL 498P (1987-88, 88-89) you will not receive credit for this course.

BIOLOGY 454 - POPULATION ECOLOGY

(3 credits) - Lectures only

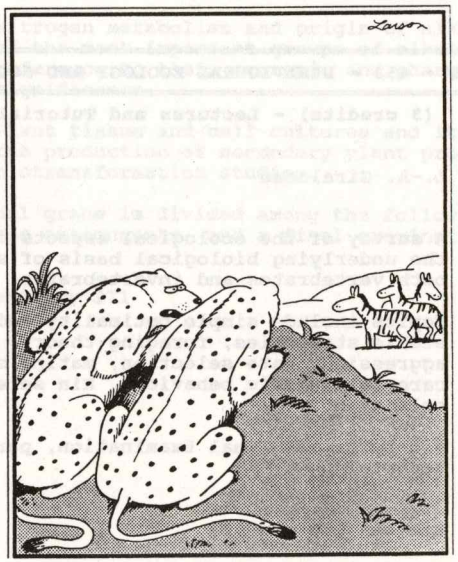
Instructor E. Maly

Description A theoretical approach to ecological problems. This is an advanced course designed to acquaint students with ecological studies that contain a large element of theory. Topics may vary in different years but will include most of the following: evolutionary aspects of ecological problems, population dynamics, species diversity, stability of ecosystems, regulation of population size, resource partitioning (competition and its avoidance) predation, island biogeography, and succession.

Many aspects of the topics discussed do not yet have substantial field or laboratory documentation; the class will attempt to outline possible procedures for obtaining evidence.

Assignments & Grading Reading assignments will be from original literature. Students may be assigned problems, and it is expected that students will have some working knowledge of CEGEP level calculus courses.

Prerequisite At least one 300 level Ecology course.



"Listen ... I'm fed up with this 'weeding out the sick and the old' business ... I want something in its prime."

BIOLOGY 460 - MOLECULAR GENETICS

(3 credits) - Lectures only

Instructor M.B. Herrington

Description Microbial genetics and two other topics chosen from the following will be discussed: biosynthesis of DNA, molecular mechanism of recombination, genetic suppression, and protein synthesis. The emphasis in this course will be to develop an understanding of the theoretical frame work and experimental approaches of molecular genetics. In particular, we will discuss the isolation of specific kinds of mutants, their characterization by genetic, biochemical and physiological techniques, and the information derived from such studies. A textbook is required, and a list of recommended reference books and original journal articles will also be provided.

Assignments & Grading Course work will include problems, termpaper(s) and examinations.

Prerequisite Biology 261 and Chemistry 271 previously or concurrently, or permission of the instructor

Note This course will not be given 1990-91.

BIOLOGY 461 - ADVANCED GENETICS

3 credits) - Lectures and Seminars

Instructor C. Beckman

Description Students are required to read papers which deal with modern genetics, and they are asked to give two to three oral presentations of material that they have learned from reading journals. To a certain extent, the content of the course depends upon the interests of the participants.

Assignments & Grading A term-paper is required. There is a take-home final with essay questions in this course.

Prerequisite Biology 261

BIOLOGY 462 - IMMUNOLOGY

(3 credits) - Lectures and Conferences

Instructor J.A. Kornblatt

Description A course in modern immunology stressing the following areas of study: the structure and properties of antigens and antibodies; the nature of the immune response; cellular antibody synthesis; genetic aspects of antibody synthesis; theories relating antibody specificity to genetic potential.

Assignments & Grading Essay and final examination

Prerequisite Biology 261, 364, Chemistry 271 previously or concurrently

BIOLOGY 463 - DEVELOPMENTAL BIOLOGY

(3 credits) - Lectures only

Instructor H. Enesco

Description In this course, our objective is to gain an understanding of the mechanisms controlling the differentiation of cells and the development of organisms. We will consider cell interactions and molecular events in development. Embryonic induction, cell sorting, tissue assembly, control of cell growth, and gene control of cell differentiation will be examined.

We will further explore, as time permits, the biological basis of cancer cell differentiation, of metamorphosis and of regeneration. Transgenic influences on development, growth control, cell growth factors and chemical morphogens may be examined.

Assignments & Grading Short term papers and seminars are required. Midterm and final examination.

Prerequisite Biology 261 and 334. Biology 334 may be waived for students with GPA of at least 3.0.

BIOLOGY 464 - ADVANCED CELL PHYSIOLOGY

(3 credits) - Lectures only

Instructor Dr. Germinario

Description A course in which an attempt is made to discuss current topics in cell biology and biochemistry. Methods of in vitro culture of animal and human cells are presented. Other subjects covered include detailed discussions of: the biochemistry of the cell cycle, the cell surface, factors involved in the control of cell replication in normal and tumour cells, mechanisms of peptide and steroid hormone action, second messenger generation, cell hybridization techniques and applications in the study of the control of gene expression.

Assignments & Grading Essay and final examination.

Prerequisite Biology 364; Chemistry 271 previously or concurrently

BIOLOGY 465 - BIOLOGICAL REGULATORY MECHANISMS

(3 credits) - Lectures and Conferences

Instructor E.B. Newman

Description A survey of methods used by cells to control the rates of biochemical reactions. Cells are rarely wasteful, products they make are made in just the amounts needed. The cell can respond rapidly to changes in its environment, ceasing to make compounds which are suddenly supplied to it - or starting to make others as called for.

The controls on enzymatic reactions which allow this efficiency are surveyed in this course. Effects on enzyme activity (feedback inhibitions, enzyme-catalyzed enzyme modification, induction, etc.) - among others - are considered.

The emphasis of this course is on the logic of scientific experimentation. The course discusses the experimental evidence on which concepts of enzyme regulation are based, which experiments are likely to give answers, how ideas in the field have developed.

Assignments & Grading Exams consist largely of experimental results from the literature which students are asked to analyze. Students are also asked to do reports on three papers from the current literature.

Prerequisite Biology 261 and Chemistry 271, or permission of the Department

Please Note This course will not be offered in 1990-91.

BIOLOGY 467 - CYTOGENETICS

(3 credits) - Lectures only

Instructor R. Cronin

Description Designed to complement courses in cell biology and genetics, this course may be described as a concentrated examination of chromosomes, both plant and animal, as to their structures, numbers and behaviour, whether normal or abnormal, as well as their roles in species maintenance and diversification. Examples from horticulture, agronomy, agriculture and veterinary and human medicine are studied for an understanding of inheritance of defects and benefits of organisms, their productivity and species stability.

Assignments & Grading Final mark is based upon term paper, midterm and final exam.

Prerequisite Biology 261 and 365, or permission of the Department

BIOLOGY 470 - MICROBIAL PHYSIOLOGY

(3 credits) - Lectures only

Instructor E.B. Newman

Description A survey of the diverse ways in which microorganisms derive energy and build cell constituents. How does an organism like Thiobacillus thiooxidans survive at pH 1 and derive energy from oxidizing sulfur? Is its metabolism fundamentally different from that of E. coli which lives in an animal intestine at 37°C, from B. stearothemophilus which carries out its metabolic affairs at 55°C, or a methane bacterium that won't grow at all if any oxygen is present?

The course surveys the biochemistry of energy-yielding reactions, compares pathways in similar and diverse organisms, and considers metabolic balance sheets. In addition, an attempt is made to understand the ecological niche of organisms in terms of their biochemistry i.e., in what ways are organisms diverse. On the other hand an attempt is made to derive some general principles of the biochemical requirements for microbial life by finding the similarities in diverse organisms.

Assignments & Grading To be arranged with participants in the course.

Prerequisite Biology 270 and Chemistry 271

Please Note This course will not be given 1990-91.

BIOLOGY 490 - INDEPENDENT STUDY

(6 credits)

Instructor Faculty

Description This program provides an opportunity for 3rd year students to conduct independent laboratory and literature research on a topic of special interest. This course is particularly suited for students who are considering a career in research, for it tests one's ability to think creatively and critically, to appreciate and develop concepts, to acquire in-depth knowledge, to analyze and solve problems, and to conduct laboratory projects in Biology with skill.

Assignments & Grading The projects will be graded on the basis of the work done, the written thesis and the oral defense of the thesis. Because students must obtain an agreement from a Biology professor to supervise their projects, they are advised to make these arrangements and notify the program's Co-ordinators at the end of their 4th semester of study.

Prerequisite 3rd Year Honours Programme. Students with high academic standing and entering the third year Biology Specialization programme may be granted permission to take this course.

Please note Students must obtain permission of the Biology 490 Coordinator to register for this course. Students may register in September, January or June for this course, but work must continue over two consecutive semesters.

"This is what I call a cancer research programme!"

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY

(3 credits)

The following special topics courses will be given in the 1990-91 year. Special topics courses can be applied to the various subject areas, according to their titles. Thus, "BIOL 498A - Selected topics in animal biology; Neurophysiology" would be credited as an animal biology course. In all cases, the first part of the title will indicate the subject area.

498A/2 - ADVANCED TOPICS IN ANIMAL BIOLOGY
Subject - Neurophysiology

Instructor D. Pocock

Description The course gives the advanced student an in-depth understanding of certain aspects of neurophysiology. The overall theme is integration and behaviour. The course progresses from integration at a cellular level, such as bacterial chemotaxis, through integration at the system level, which includes learning and memory, to complex behaviour such as the central nervous system control of mammalian sexual behaviour.

Assignments & Grading A selection of 70 articles from the research literature, which requires 5 hours reading time per week outside class time. 2 midterms, each worth 20%; final exam, worth 60%.

Prerequisite Biology 333 or 364 or Chemistry 271 or permission of the professor; Psychobiology students see Dr. Pocock.

498D/4 - ADVANCED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - Gene Structure

Instructor R. Storms

Description This course deals with gene regulation in eukaryotes. Topics covered will include transcription, transcript processing, translation, and posttranslational processes.

Assignments & Grading Final grades will be based on a combination of term papers and examinations covering lecture material and assigned readings.

Prerequisite Biology 261, 270, Chemistry 271 or permission of the Department

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498E/4 - ADVANCED TOPICS IN BOTANY
Subject - Perspectives in Plant Tissue Culture and Biotechnology

Instructor B.S. Mangat

Description The course will deal with various aspects of plant tissue cultures. Particular emphasis will be placed on the growth regulator, nutritional and other factors necessary for <u>in vitro</u> culturing of plant cells and tissues. The course will also discuss the methods available for nuclear material transfers and the propagation of transformed plants.

Assignments & Grading T.B.A.

Prerequisite Biology 346

Please Note The Undergraduate Class Schedule has "Plant Growth and Development" as the subject title of this course, it should read: "Perspectives in Plant Tissue Culture and Biotechnology".

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498I/2 - ADVANCED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - DNA Repair

Instructor R.M. Roy

Description Lectures will be presented on a series of topics concerned with chemical alterations to replicating and non-replicating DNA arising spontaneously or as a result of exposure to ionizing and ultraviolet radiation or chemical mutagens. Mechanisms of enzymatic repair of DNA damage in prokaryotes and eukaryotes will be presented with particular emphasis on recent research literature. Students will be given references to books, monographs, conference proceedings and journal articles and will be expected to contribute to class discussions arising in conjunction with lectures. In addition to giving a detailed picture of chemical alterations that can occur in DNA, special emphasis will be given to experimental techniques by which relatively rare damage sites in DNA can be detected in order to study progression of repair. The following types of DNA repair will be considered: 1. direct reversal of damage (e.g., photoreversal of pyrimidine dimers, DNA methyltransferase, ligation of single-strand breaks); 2. excision repair by glycosylases and AP endonucleases; 3. excision repair by direct acting endonucleases (e.g. uvrABC complex of E. coli); 4. post-replication repair and damage tolerance mechanisms (recA-dependent recombinational repair); 5. inducible error-prone repair processes (e.g., SOS processing). In addition, the role of polymerases in patch size, mismatch repair and human genetic disorders affecting DNA repair will be considered.

Assignments & Grading Students will be evaluated on participation (10%), an open-book mid-term (30%) and a 24-hr take-home final assignment involving analysis of a recent paper (60%).

Prerequisite Biology 261, 364 or 365 and Chemistry 271

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498K/2 - ADVANCED TOPICS IN ECOLOGY
Subject - Advanced Topics in Ecology

Instructor D. Fairbairn

Description This course covers all aspects of current research in ecology. Topics may include studies in evolutionary, behavioral, population, community, systems and conservation ecology. Through oral presentations and written critiques of papers from current ecological journals, students learn to critically evaluate both the strengths and weaknesses of published research. Each paper is assessed with respect to the quality and general significance of the hypotheses tested, experimental design and methods of analysis, and conclusions. Students select the papers for presentation in consultation with the instructor, and present the paper to the class orally, with appropriate visual aids. This presentation is followed by a class discussion. In addition to the oral presentations (4-5), each student must write a 5-10 page summary and critique of at least 5 other papers. Students are also expected to read at least one of the papers presented each week, in addition to those they present themselves, and to participate in class discussions.

Assignments & Grading 60% of the final grade is based on the oral presentations. Of this grade, 10% is for choice of paper (general significance, difficulty and quality), 10% is for style of presentation (use of appropriate visual aids, etc.), and 40% is for content. 30% of the final grade is based on the written critiques, and 10% is based on participation in class discussions.

Prerequisite Biology 250, 322

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498L/2 - ADVANCED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - Endocrinology

Instructor M. Enesco

Description The interrelations of hormones, their metabolic effects, their synthesis and secretion will be developed for hypothalamus, pituitary, thyroid, parathyroid, islets of Langerhans, adrenals, gonad and gut.

Assignments & Grading Tentatively, the evaluation will be based on Class Exams and the Final Examination.

Prerequisites Biology 333 or equivalent Systems Physiology course previously or concurrently. This prerequisite will not be waived. Cell physiology will not be accepted as a prerequisite.

498Q/4 - ADVANCED TOPICS IN BOTANY
Subject - Biochemistry of Photosynthesis

Instructor G. Espie

Description This course examines the photosynthetic process in prokaryotic and eukaryotic organisms. Topics include organization and function of the light harvesting complexes, electron transport, photophosphorylation, photosynthetic carbon reduction (Calvin) cycle and associated enzymes, regulation of C_3, C_4, and CAM pathways of carbon assimilation, photorespiration and CO_2-concentrating mechanisms. Recent advances in the identification and characterization of genes coding for proteins involved in photosynthesis will also be discussed. Emphasis will be placed on integrating the biochemical aspect of photosynthesis with the physiology of intact organisms in their natural environment.

Assignments & Grading Tentatively, evaluation will be based on mid-term and final examinations, an essay and/or seminar presentations

Prerequisite Biology 240, Chemistry 271 or permission of the instructor.

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498S/4 - ADVANCED TOPICS IN ECOLOGY/ECOTOXICOLOGY
Subject - Intermediate Statistics

Instructor G. Selig

Description In this course, the student will develop an understanding of, as well as an appreciation for, two fundamental statistical procedures - multiple regression and analysis of variance.

A quick review of basic elementary statistics, based on the view that a good foundation in elementary statistics makes for an easier understanding and utilization of advanced statistical procedures, will be followed by an intensive study of regression, multiple regression, and analysis of variance techniques. The ultimate goal of the course is to give students sufficient understanding of statistical procedures that they will encounter little difficulty understanding discussion of statistical procedures in most texts and journals.

At each step of the course, a basic understanding of the statistical mechanisms involved in the procedures will be encouraged while recognizing that the **effective application** of the techniques is the primary goal of the course. Because of the practical side of the course, computer assisted statistical analysis of data will be an integral part of the presentation.

The course will be made up of a two hour lecture **and** a two hour laboratory each week.

Assignments & Grading Tentatively, the course will require weekly assignments (45%), a mid-term (25%) and final (30%) take home exam.

Prerequisite Permission of the Department (students must have an up-to-date knowledge of the statistical procedures taught in an introductory statistics courses (such as Biology 322)).

Note This course is equivalent to CHEM 533.

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498T/2 - ADVANCED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - Genetic Rearrangement and Gene Expression

Instructor C. Cupples

Description One of the ways in which cells regulate gene expression is by physical rearrangement of the DNA. Unexpressed genes can be activated by moving them to new positions in the genome. The level of expression of already active genes can be increased dramatically by increasing the number of copies of the gene. Genetic regulation of this type is found in a wide variety of organisms from microbes to man.

This course will examine gene rearrangement in bacteria (E. coli, Salmonella), yeast, various protozoa, Drosophila, and mammalian cells, among others. It will be concerned with both the biochemical mechanisms of rearrangement, and the biological consequences.

There is no required text for this course. Lecture material will be drawn from the scientific literature.

Assignment Students will be required to submit at least one oral and one written presentation on specific topics.

Prerequisite Biology 261, 270, Chemistry 271 or permission of the Department

BIOLOGY 498 - ADVANCED TOPICS IN BIOLOGY (Continued)

498V - ADVANCED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - Mechanism of Protein Synthesis

Instructor M. Herrington

Description The translation of the nucleotide sequence of a messenger RNA into the amino acid sequence of a protein involves over one hundred different proteins and RNAs. We will examine current research into the role of these molecules in translation. This will involve both in vivo approaches and in vitro approaches. Specific topics may include how aminoacyl tRNA synthetases recognize the appropriate tRNA, how the ribosome slips or hops while decoding the mRNA, and the role of the ribosomal RNA. Readings will be taken from the literature. The final grade will be based on examinations, assignments and class participation.

Prerequisites Biology 261, Chemistry 271, Chemistry 374.

498W - ADVANCED TOPICS IN CELL AND MOLECULAR BIOLOGY
Subject - Protein Engineering

Instructor H. Khouri

Description Protein engineering is a new technology which allows the synthesis of novel proteins and permits the design of existing ones. This course is intended for senior undergraduate and graduate students with background in biochemistry and/or molecular biology. It outlines the fundamental principles involved in protein engineering and their applications in industry and medicine. Methods in protein chemistry and genetic engineering will be discussed in relation to enzymology. Particular emphasis will be given to examples from the literature of a number of engineered proteins with the aim of introducing the students to the field of protein engineering.

Assignments & Grading T.B.A.

Prerequisite Biology 261, Chemistry 271, Chemistry 374 or permission of the Department.

Note This course is available to graduate students under BIOL 683